UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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OFFICE OF
PESTICIDES AND TOXIC
SUBSTANCES

MEMORANDUM

SUBJECT: Review of Benomyl Poisoning Incidents

TO: Kate Bouve, 6a2 Officer
Special Projects and Coordination Staff
Program Management and Support Division (H7502C)

FROM: Jerome Blondell, Health Statistician
Special Review and Registration Section
Occupational and Residential Exposure Branch
Health Effects Division (H7509C)

THRU: Steve Knott, Acting Head
Special Review and Registration Section
Occupational and Residential Exposure Branch
Health Effects Division (H7509C)

Larry Dorsey, Acting Chief
Occupational and Residential Exposure Branch
Health Effects Division (H7509C)

Three sources of pesticide incident reports have been examined to determine whether the reported health problems with benomyl in Florida have been reported elsewhere. These sources include the California physician diagnosed reports of occupational cases from 1982 to 1990, the National Pesticide Telecommunications Network voluntary reports 1987 to 1991, and voluntary reports to the Pesticide Incident Monitoring System from 1971 to 1980. Note that Benomyl in the dry flowable formulation (also termed granular) was only in use during the years 1987 through March 1991 when the STOP SALE, USE OR REMOVAL ORDER was issued.

According to the Florida report there were 75 completed interviews of which 67 were tabulated for the symptom count. Eight cancer cases were excluded from this tabulation. The leading symptom reported were:

1. headaches	42	63%
2. stiff/achy joints	33	49%
3. shortness of breath	26	39%
4. fatigue	22	33%
5. rashes	20	30%
6. swollen joints	18	27%
7. sore/irritated throat	18	27%

8. nausea	18	27%
9. dizziness	17	25%
10. numbness and tingling of the extremities	15	23%
11. short term memory loss	13	20%
12. nose bleeds	13	20%

Of these symptoms, the rashes and sore or irritated throat are the only ones that would normally be expected to result from benomyl exposure. Note that there were less common symptoms also reported in this group including hair loss, ulcerations in the mouth, and change in taste.

California occupationally-related benomyl cases, 1982-1991

California reported 41 cases involving benomyl alone where it was determined to be the likely causative agent for the injury or illness. 71% of these cases involved dermal, eye, or respiratory irritation or effects of the type normally expected from benomyl exposure. Another 24% could not be categorized due to lack of information on specific symptoms. Only 2 cases or 5% had symptoms (weak, dizzy, and vomiting) that would be considered unusual for a noningestion exposure to benomyl. Only 1 of these two cases occurred in the 1987 to 1991 time period when the granular formulation of benomyl was available. Note that these cases represent acute episodes resulting in an immediate visit to the physician. Therefore these cases are not directly comparable to the Florida cases which reported their symptoms persisting or occurring weeks or months after the initial exposure.

California also reported 238 cases involving benomyl in combination with other pesticides. 74% of these cases involved dermal, eye, or respiratory irritation or effects of the type normally expected from benomyl exposure. Another 19% could not be categorized and 15 or 6% had symptoms that would be considered unusual for a noningestion exposure to benomyl. The 6% does not include symptoms that I would consider likely due to the other pesticide(s) involved in a particular exposure. For example, if headache was reported and the exposure included an organophosphate, I did not include the case in the 6% which includes only those cases considered possibly related to benomyl. The principle unusual symptoms reported (whether benomyl alone or in combination with other pesticides) were headache (7 cases), nausea (4), and dizziness (2). In 84% of the California benomyl-related cases the crop was identified. Of the 235 cases were crops were identified, 24% were crops likely to be grown in a nursery or greenhouse.

National Pesticide Telecommunications Network 1987-1991

From 1987 to 1991 when dry flowable or granular formulation of

benomyl was on the market the Texas Tech NPTN received 46 calls related to exposure to this pesticide. 33 of these calls involved exposure to benomyl in combination with other pesticides and 13 calls involved benomyl alone. Of the 13 involving benomyl alone, 8 had unusual symptoms possibly consistent with the cases reported in Florida. They are summarized below:

1. Massachusetts case developed interstitial lung disease
2. Missouri case exposed to contaminated benlate, developed nausea, vomiting, diarrhea, headaches, and convulsions.
3. Florida case developed nausea and cough.
4. Tennessee case spilled product a year ago (1988) had problems with odor, taste in mouth, affected lungs. Sold house and moved to get away from effects of spill.
5. Virginia case spilled some on ankle and had an extreme reaction in her joints.
6. Tennessee case (probably the same as the one above) spilled on counter and developed diarrhea, change in taste, claims his life is a "burning hell" and that contamination has spread "like crazy".
7. Massachusetts landscaper had dermal exposure and appears nervous but no skin irritation.
8. New York farm worker gets headaches and rash on her arm when working in vineyard.

Among the 33 cases involving benomyl in combination with other pesticides, there were 6 that potentially related to the Florida cases. They were:

1. Washington nursery worker exposed to benomyl and 4 other chemicals including one organophosphate. Had nausea, vomiting, and severe headaches; however cholinesterase level was elevated.
2. New York nursery worker got benomyl and Truban (both skin irritants) on hands and developed nausea and diarrhea.
3. Pennsylvania case has hives and vomiting, exposed to two other pesticides.
4. Florida case said to be chemically sensitive and exposed to dicofol and lindane as well. Developed dermatitis and difficulty breathing whenever tree farm near house was sprayed.
5. New York agricultural worker had hose burst exposing him to maneb and benomyl. Experienced swollen eyes, skin irritation, difficulty breathing, and headaches.
6. Iowa case over 64 years old had shortness of breath, abdominal pain (not nausea), tires quickly, sleeplessness, and problems relieving himself. Also exposed to diazinon and malathion.

Pesticide Incident Monitoring System Report no. 405

The Pesticide Incident Monitoring System (PIMS) had a total of 153 benomyl-related human incidents of which 54 involved benomyl alone and 99 involved benomyl in combination with other pesticides. Of the 54 incidents with benomyl alone, only 4 involved unusual symptoms as summarized below:

1. California case in 1977 reported nausea, vomiting, and

dizziness.
2. California case in 1978 reported headache and nausea.
3. California case in 1978 reported congested eyes, nose, redness of face and headache.
4. Michigan case in 1979 reported light-headedness and lack of coordination.

There were 4 other cases reported in the PIMS involving benomyl in combination with other pesticides where headache and other symptoms were reported that would not have been expected to result either from benomyl exposure or the other pesticides.

Florida Contacts concerning Benomyl

I have received 8 phone contacts from Florida in the past two months regarding benomyl exposure and symptoms. A brief summary of my notes from these calls follows:
1. Adult male complained of being chronically sick and tired, and had testicular cancer diagnosed in 1992.
2. Adult male called had chronic fatigue, tired by midday, pain in joints, headaches, and feels better when off work.
3. Adult male called and discussed Dr. Sacarello's plans to conduct physical exams on 10 cases affected by benomyl.
4. Adult female reported that family has severe unusual fatigue and nose bleeds. Son develops nose bleeds after playing outside in contaminated area. Daughter (teenager) goes to bed early due to fatigue instead of out for school function or with friends.
5. Adult male reported 3 miscarriages, a tubular pregnancy, 1 stillbirth and 1 learning disability among 11 pregnancies at his nursery. The adult male reported that the women with these problems had medium to heavy exposure to benomyl during their pregnancy and that there were 7 other pregnancies that came out fine where minimal exposure was reported. One of these mothers (tubular pregnancy) reported vomiting, headaches, tingling fingers during time of direct exposure. A 43 year old male reported chemical bronchitis, tingling fingers, and swollen joints. Reports that his partner had testicular cancer diagnosed in 1988.
6. Adult male reported testicular cancer diagnosed in 1986 and reported that he had 15 years prior exposure to the wettable powder formulation of benomyl. He reported that in his area of Florida, benomyl was probably the most used pesticide on nurseries.
7. Adult male had problems start in 1989. Gets rash on feet and groin area, headaches that last for days, fatigue, nervousness, perspires heavily, has a body odor, back pain, cramps in neck, runny nose, and previously had nose bleeds. His 2 daughters have a rash in the groin area, and the 7 year old has headaches and chronic urge syndrome (to urinate) although doctor has found no evidence of infection. Headaches and nose bleeds were the first symptoms to appear in the adult male.
8. Adult female reported headaches, burning throat, bloody mucous, nose bleeds, joint pain, and memory loss. Two daughters, one has headaches, stomach aches, joint pain, and trouble on spelling tests

and multiplication tables (memory loss) even though previously she was very good at such tasks. Teacher said the child did not have a learning disability and therefore could not explain the problem.

Conclusion

For the most part, the symptoms reported in Florida appear to be unique to that area. Other reports from California, NPTN, and PIMS demonstrated that the majority of benomyl exposures result in dermatitis and other irritant type effects. There were a minority of cases in these 3 datasets that demonstrated symptoms somewhat similar to what had been reported in Florida. The California dataset contained 17 cases similar to the Florida cases, headaches being the most prominent symptom. The NPTN contained 13-14 cases similar to those reported in Florida and perhaps 4 of the cases involving exposure to benomyl alone demonstrated a strong resemblance to the Florida reports (notably headaches, joint pain, change in taste). A couple of cases involving exposure to benomyl in combination also seemed similar to the Florida reports. The PIMS reports do not involve the granular formulation of benomyl but do suggest that under certain conditions exposure to benomyl can lead to headache and nausea.

The Florida symptoms were usually chronic and reported long after initial exposure. The information from California, NPTN, and PIMS is limited mostly to acute exposures and effects and therefore is not a proper basis for judging consistency of symptoms with other parts of the country. Given the limited data collected, its voluntary nature, and the absence of medical documentation it is not possible to say whether the problems experienced in Florida are identical to those experienced elsewhere. It does appear likely that benomyl, can cause systemic poisoning symptoms such as headache and nausea under unusual circumstances. And some of the reports from California and the NPTN are suggestive of the types of problems reported in Florida. Further study is indicated of individuals with the unusual symptoms that have been reported in Florida